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First issue of the year

This is the first issue of *The Giovanni News* for 2011. We have been trying to produce an issue every quarter; this year has been a busy one, so suddenly mid-April became mid-May, and publishing four issues this year seemed somewhat unlikely. So we're doing what other journals that get behind the calendar do; we're publishing an expanded double issue!

There is a lot going on in the 'verse (the "Giovanni-verse"), so we hope you'll enjoy reading this expanded (and slightly late) issue 1 and 2 of the 2011 volume of *The Giovanni News*.

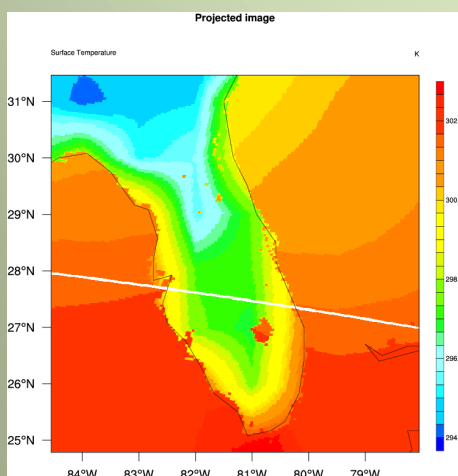
Regards,
Your Editor

Preview the next-generation Giovanni in YOTC

YOTC stands for the "Year of Tropical Convection" YOTC is a joint project of the *World Climate Research Programme (WCRP)* and the *World Weather Research Programme (WWRP)/THORPEX*, consisting of a 2-year period (May 2008 – April 2010) of coordinated observing, modeling, and forecasting with a focus on organized tropical convection, its prediction, and predictability. The main Web site for YOTC is <http://www.ucar.edu/yotc/>.

The NASA GES DISC is a partner in YOTC, and has created two Giovanni portals serving Level 3 data (the standard Giovanni portal) and Level 2 data, which utilizes the evolving next-generation Giovanni-4 (G4) architecture. G4 will provide new analytical capabilities while retaining the current Giovanni capabilities, and it will make it easier and faster to implement new algorithms and add data sets.

The YOTC portal at the NASA GES DISC is located at <http://disc.sci.gsfc.nasa.gov/YOTC>.



One-kilometer spatial resolution map of MODIS-Aqua surface temperature over Florida on August 15, 2008, generated with the YOTC Giovanni-4 system. The waters of Lake Okeechobee, Tampa Bay, and Charlotte Harbor were warmer than the land surface temperature.

Early returns on 2011 publications

(336 total)

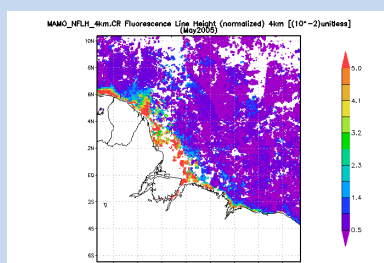
At the end of April 2011, an update to the Giovanni publications list for 2011 discovered 35 new journal papers which utilized Giovanni, bringing the current total for 2011 to 42 – a rate of over 10 research publications a month! One of the more interesting publications in this update was Witte et al., "The unique OMI HCHO/NO₂ feature during the 2008 Beijing Olympics: implications for ozone production sensitivity," published in *Atmospheric Environment*. Other recent publications analyzed species sensitivity to human sound emissions in the Mediterranean Sea, and the potential for root rot in bean plants in East Africa assessed using different types of rainfall data.

Ocean Color Radiometry updates data products

The GES DISC recently finished adding current MODIS-Aqua data products at both 4 and 9 kilometer spatial resolution (monthly temporal resolution) to our [Ocean Color Radiometry Giovanni data portal](#). This update is an element of the NASA-funded **Water Quality for Coastal and Inland Waters** project (PI: Zhongping Lee; Co-I: James Acker). Several other Co-Is are involved with this project, which is working on the refinement of data products for particular application to coastal and inland waters.

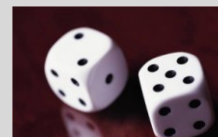
This update is significant for several reasons:

- One, this is the first time that 4km spatial resolution data ocean color data products have been available in Giovanni. (Please be aware that processing times will be slower with this higher spatial resolution data set.)
- Two, the new MODIS data products include all remote-sensing reflectances (Rrs), as well as MODIS-Aqua particulate inorganic carbon (PIC), particulate organic carbon (POC), Photosynthetically Available Radiation (PAR), and normalized fluorescence line height (nflh).
- Three, we have changed the file-naming convention in the Giovanni system so that we will be able to quickly update the data archive when the Ocean Biology Processing Group performs a data reprocessing.



MODIS-Aqua 4km resolution normalized **Fluorescence Line Height (nflh)** image of the coast of Brazil near the mouth of the Amazon River, in May 2005. Fluorescence line height is a measure of chlorophyll fluorescence, which indicates the efficiency of photosynthesis. It is thus diagnostic of both the presence of living phytoplankton and their physiological fitness.

DICCE gets rollin'



DICCE stands for, **Data-enhanced Investigations for Climate Change Education**, a new project at the GES DISC. DICCE is a collaboration between SRI International, led by Principal Investigator Daniel Zalles, the GES DISC, and several groups of teachers, located in New Mexico, Massachusetts, the San Francisco Bay area, and San Diego, California. What makes DICCE exciting for all of these groups is that it will enable the first education-optimized implementation of NASA's innovative Giovanni data analysis system.

For years, the GES DISC has believed (and educators from high school to graduate school have told us) that Giovanni is a great educational asset. Yet the chance to work with educators on a funded, multi-year project to make Giovanni into a true educational resource has not occurred before now. Working with the educational resource experience of SRI International, teacher-testers of the new Giovanni educational portal, and an experienced program evaluator, the three-year DICCE project will produce an integration of Giovanni's data analysis capabilities and a "learning environment" allowing teachers to construct instructional scenarios focused on climate change at the local and regional level. Giovanni will also allow educators to put local and regional climate observations and trends into a global context.

The DICCE education portal (called "DICCE-G") will put numerous meaningful data products in the same location, so that they can be visualized and analyzed simultaneously. Current documentation of these data products will be augmented, and the DICCE-G "Help" section will feature numerous tips, tricks, and short tutorials on the basic functions of Giovanni. Odds are, DICCE will become a frequently-utilized resource for classroom research on climate change!

Using Giovanni to monitor the world's coffee-growing regions

Spurred by reports of reduced coffee crops in Colombia and Costa Rica — caused by a combination of heavier-than-normal rains in the coffee-growing regions of Colombia this year, and an increasing temperature trend in the mountainous coffee-growing regions of Costa Rica — the GES DISC home page recently featured an article showing some analyses of rainfall and temperature in these areas. The trends are troubling, especially to those of us that enjoy a high-quality, relatively low-cost mug of Joe in the morning. Or in the afternoon. Or both. And an after-dessert cup, too. Due partly to the fact that a cup of dark roast Guatemalan arabica is fragrantly steaming next to the desk, it seemed logical to take a look at the coffee-growing regions of Guatemala, and to determine if there are any trends of concern to the coffee interests of that country.

To perform these analyses, the Modern Era Retrospective-analysis for Research and Applications (MERRA) data set was used, in conjunction with the Willmott-Matsuura monthly rain gauge data set and the Tropical Rainfall Measuring Mission (TRMM) monthly precipitation data products. From MERRA, the surface skin temperature data product was analyzed, and the two precipitation data sets provided rain rate.

Figure 1 shows where coffee is grown in Guatemala, along the slopes of the cordillera. The best beans are grown in the areas shaded red, and lesser-quality beans in the areas shaded light brown and purple. It is clear that the coffee region is fairly narrow — and because climatic zones migrate up and down slopes rapidly as conditions change, these areas can also change quickly, too.

Figures 2a and 2b show the average temperatures in 1979 and 2010; 2010 was tied for the warmest year on record, globally. The areas of coolest temperature in Guatemala have decreased slightly in this comparison. Figure 3 shows the time-series for central Guatemala. Though trends are hard to discern, the lowest cool temperatures occur more frequently in the early years of the time-series, and the most of the warmest high temperatures more frequently in the latter years. Figure 4 shows where the rain falls in the country, plotted for the year 2000 — and it is very obvious from this plot that the coffee-growing regions are in a transitional rainfall zone from the coast to the mountainous central highlands. Figures 5a and 5b show rain rate time series in the highland region, where rainy-season precipitation has generally been declining since the 1950s. More in-depth analysis would have to examine the slope region more closely. Heavier precipitation causes an increase in coffee pests like fungus and other plant diseases — the drying trend in central Guatemala could indicate that more rain is falling on the slopes, which could be bad for the coffee crop.

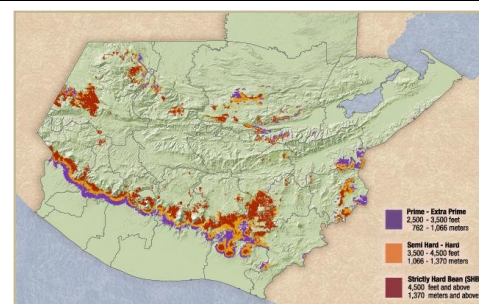


Figure 1. Map of coffee-growing regions in Guatemala.

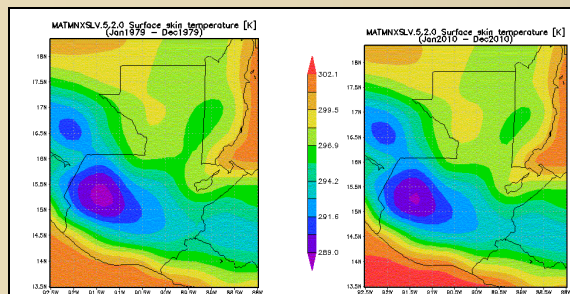


Figure 2. (a, left) MERRA surface skin temperature in 1979. (b, right) MERRA surface skin temperature in 2010.

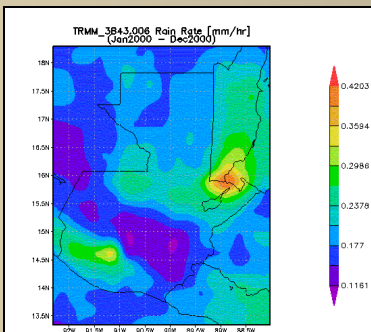


Figure 4. Map of TRMM monthly rain rate for the year 2000.

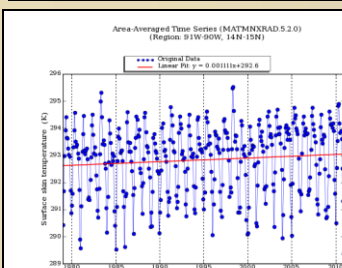


Figure 3. MERRA surface skin temperature time-series for central Guatemala.

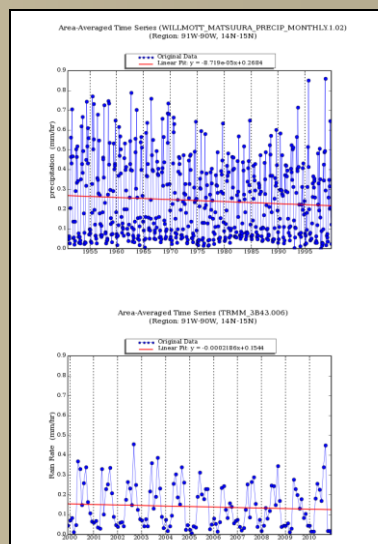
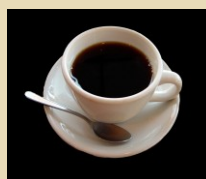
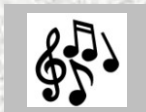


Figure 5. (a, top) Rainfall time-series, 1950-1999. (b, bottom) Rainfall time-series, 1990-2010.



Giovanni set to music

Every now and then, something comes along that is truly unexpected. Thus it was when we found out about a YouTube video showing an animation of sea surface temperatures (SST) for the Caspian Sea. The data behind the video were based on MODIS monthly SST acquired from Giovanni; the SSTs were evolved mathematically using Dr. Alexander Tarakanov's *SST-simulator* to provide a daily picture of SST changing over an entire year. This video was set to the jazz stylings of a piece entitled "Boomerang", performed by Azerbaijani musician and composer Aziza Mustafa Zadeh, the "Princess of Jazz." To see the video and hear the music, go to the YouTube video: <http://www.youtube.com/watch?v=PwUJmCLUKJU>. There are several other videos of SST set to music for various regions in this collection now, including a Black Sea animation set to the Russian Sailor's Dance!

Reference: Tarakanov, Sokolova, and Kvachev, "Intelligent Simulation of Hydrophysical Fields by Immunocomputing" Information Fusion and Geographic Information Systems, 2007: 252-262.

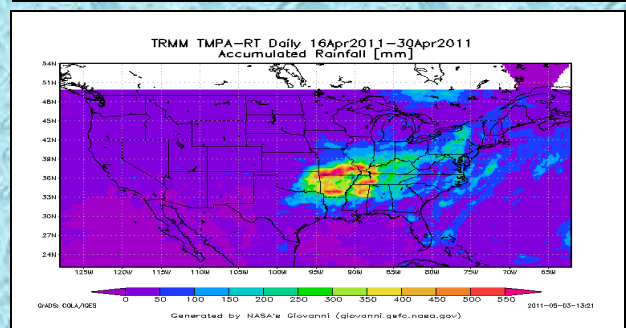
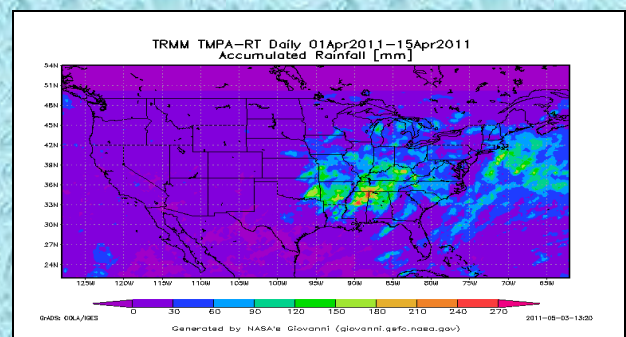
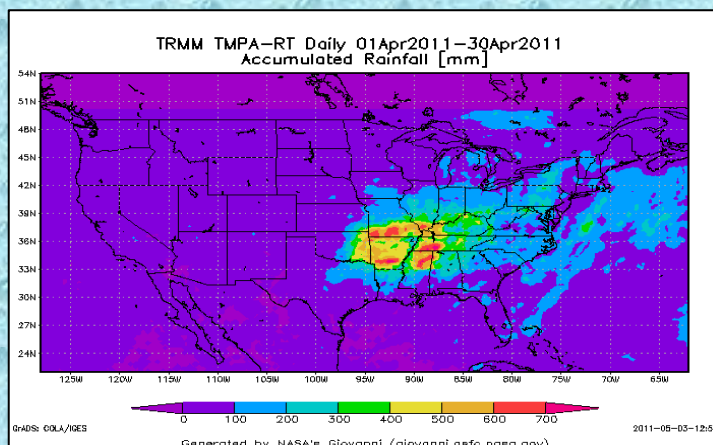
April 2011 storms cause record flooding, tragic tornadoes

The weather news in late April 2011 for the United States was dominated by the tragic tornado outbreak that rampaged through Mississippi and Alabama, part of a larger system of weather that brought heavy precipitation to the east-central section of the United States. The heavy rainfall from this weather pattern caused record flooding in many Midwestern rivers, particularly the Ohio and Mississippi. The flooding of the Ohio River caused the evacuation of Cairo, Illinois, which is located near the junction of the Ohio and Mississippi.

As the flood waters moved downriver on the Mississippi, the Army Corps of Engineers breached levees and opened flood control structures to alleviate flooding of downstream cities, including Vicksburg and New Orleans. The Coast Guard closed a 15-mile section of the river to barge traffic. It will likely take weeks for the flood waters to subside and allow residents of the affected regions the chance to assess damage and start the process of returning to normal.

Giovanni user visualizations from the user-contributed image page on the GES DISC Web site (http://disc.sci.gsfc.nasa.gov/giovanni/giovanni_user_images) utilized the near-real-time Tropical Rainfall Measuring Mission (TRMM) Multi-Satellite Precipitation Analysis data product, TMPA-RT, to observe the rainfall associated with these weather events. The images show how the rainfall intensified in the latter half of the month, the period that included the tornado outbreak, during which over 200 tornadoes were observed, including three EF-5 giants.

Total rainfall for April 2011 (below); total rainfall for April 1-15 (top right); total rainfall for April 16-30 (bottom right). The color palette for the bottom image represents *twice* the rainfall accumulation than that for the top image!



Giovanni helps make connections between NASA hydrological data and geospatial technology

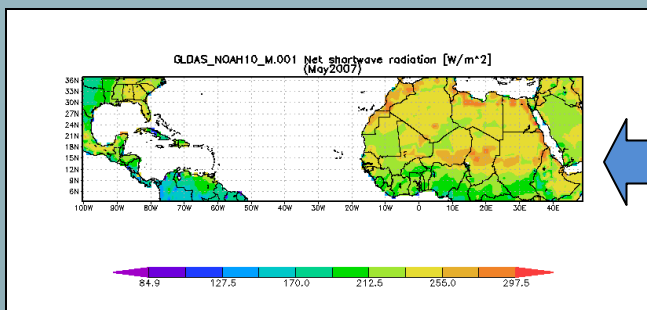
GES DISC scientists Bill Teng and Hualan Rui recently attended the American Society for Photogrammetry and Remote Sensing (ASPRS) 2011 Annual Conference, which took place May 1-5 in Milwaukee, Wisconsin. Rui and Teng were the first author and primary co-author of the paper entitled "Bridging the Gap between NASA Hydrological Data and the Geospatial Community." *

The Giovanni system is an important aspect of the GES DISC strategy to bring data from hydrological models that utilize NASA remote sensing data into the realm of geospatial technology, which is typified by Geographical Information Services (GIS). As the presentation describes, a perceived gap exists between "the world of discrete spatial objects in geographical information systems (GIS) and associated time series and the world of continuous space-time arrays as used in weather and climate science."

In their presentation, the authors described the current hydrological model data sets available at the GES DISC. Both of these data sets are produced by Land Data Assimilation Systems (LDAS). The model data at the GES DISC is from the North American LDAS (NLDAS) and the Global LDAS (GLDAS). NLDAS has data at 0.125° spatial resolution at hourly temporal resolution; GLDAS has data at either 0.25° and 1.0° spatial resolution and 3-hour or monthly temporal resolution. The presentation also describes the changes in the new GLDAS-2 model data. These data can be acquired from the Mirador data distribution system, the GrADS data server, and by anonymous FTP.

Giovanni provides a method to help bridge the "digital divide" between the GIS data needs and the type of data acquired by remote sensing. Giovanni currently includes the monthly GLDAS data set, and the addition of hourly NLDAS and 3-hourly GLDAS data to the system is in progress. Giovanni output in its three basic forms – ASCII, netCDF, or HDF – can be utilized for analysis in other software packages.

Two collaborations are facilitating the use of GES DISC hydrological data in a geospatial context. The first is the U.S. Environmental Protection Agency **Better Assessment Science Integrating Point & Nonpoint Sources** (BASINS) Project environmental analysis system. NLDAS precipitation data from the GES DISC are available via the BASINS download tool. The other collaboration is with the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) Hydrologic Information System (HIS), which integrates NLDAS and GLDAS data into a specialized hydrological GIS.



Net shortwave radiation in Watts per square meter for tropical and desert regions on either side of the Atlantic Ocean, for May 2007. GLDAS NOAH model data were visualized with Giovanni for this image.

*The other authors of the presentation were Bruce Vollmer, David M. Mocko, Hiroko K. Beaudoin, Joseph Nigro, Mark Gray, David Maidment, and Richard Hooper.

Giovanni: look up, down, and all around the world of NASA remote sensing data

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<http://giovanni.gsfc.nasa.gov>